

Mount Diablo Astronomical Society

March 2013

Diablo Moon Watch

NEW LOCATION

GENERAL MEETING

Tuesday March 26, 2013

Merging galaxy clusters, dissections of the cosmos

By Will Dawson, UCD

**Doors open at 6:45 p.m.
Lindsay Wildlife Museum
1931 First Avenue,
Walnut Creek, CA 94597**

**Please park West of the
museum, follow the
instructions on the last page**

Galaxy clusters are the largest objects in the universe, containing hundreds to thousands of galaxies all gravitationally bound and orbiting one another.

However, the majority of a galaxy cluster's mass is in the form of hot gas (13%) and dark matter (85%). Dark matter is a mysterious newly discovered form of matter that actually makes up the majority of the mass in our universe. When two galaxy clusters are close enough to one another they gravitationally accelerate towards each other and eventually collide. These collisions are the most energetic events



since the Big Bang and provide unique dissections of the cosmos, as the galaxies, gas, and dark matter become dissociated during the merger. By comparing and contrasting the behavior of the mysterious dark matter with the well understood galaxies and gas we are beginning to shed new light on dark matter.

Will Dawson is currently a Ph.D. candidate in the Physics Department at the University of California Davis. His research is focused on elucidating the properties of dark matter, a mysterious form of matter that makes up the majority of the mass in the universe. He uses some of the world's most powerful telescopes (including the Hubble and Chandra space telescopes as well the 10 meter Keck telescopes in Hawaii) to study merging galaxy clusters.

Will actually got his start as an offshore structural engineer after receiving his bachelors in Maritime Systems Engineering from Texas A&M. At Technip, an engineering firm based in Houston Texas, he performed the structural design and engineering of SPARS, 500 ft long by 100 ft diameter floating offshore oil platforms. In 2006 he received the Jacques Franquelin Award, the company's most prestigious award. Following this he went to the University of Texas at Austin to pursue his true passion, astrophysics. He is now at UC Davis where he received his Masters of Physics in 2008 and will receive his Ph.D. in Physics in 2013.



The Colliding Spiral Galaxies of Arp 271

WHAT'S UP

By John Reid

I'll be discussing how we could soon be entering the age of the low-cost reusable rocket!

How advances in heat shielding and additive-manufacturing are changing the way we build spacecraft. Most impor-

(continued on page 6)

PRESIDENT'S CORNER

Giant Eyepieces (Part 1)

by Chris Ford

There are some extraordinary eyepieces being manufactured today, and I will confess to a fascination with the largest and more outrageous.

The grandfather of all giant eyepieces is of course the six lens Nagler 31mm Type 5 "Terminagler" that weighing in at 35.2 ounces or 2.2 lb.'s is a standard in many an eyepiece collection. It was more recently surpassed slightly by the 21mm Ethos weighing in at 2.25 pounds or 36 ounces. Televue has inspired imitators, and Meade subsequently bought out its 30mm UWA weighing in at just under 3 pounds and the size of a small grapefruit. Explore Scientific also now offers a 30mm six lens clone of the Nagler Type 5 weighing in at an almost identical 2.2 pounds. All of these are long focal length 2" barrel eyepieces with very wide fields of view requiring a lot of complex glass to deliver their expansive "spacewalk" views.

Later last year, a radical new contender entered the giant eyepiece league from Explore Scientific in the shape and form of the ES 9mm 120 degree hyper-wide eyepiece, weighing in at over 3 pounds.

The no less than 12 lenses in this particular eyepiece design are not associated with a long focal length however, but rather offer a much higher 9mm magnification combined with an immense and unprecedented 120 degree apparent field of view. The eyepiece design is not a clone of any other on the market and is an innovative new departure for Explore Scientific.

Personally I have never previously bought any eyepiece from Explore Scientific, in all honesty regarding them as slightly lower quality Chinese manufactured clones of Televue that are manufactured to a lower cost, though most reports are that they are now very good indeed. Not that Televue can entirely wrap itself in the red, white, and blue, given its eyepieces are manufactured in Taiwan and Japan. Still they are designed and supported by Al Nagler and team here in the USA, and Televue has been consistently innovative in offering several generations of high quality wide field eyepieces that have revolutionized observational astronomy. The superlative optical qualities of the current Ethos and Delos lines are testimony to that record.

However, Explore Scientific

appears now to be innovating more radically in ways that Televue is not. Not only has the company introduced the above mentioned ES 120 degree 9mm eyepiece, but they are also now prototyping a larger 3" diameter barrel eyepiece and accompanying diagonal that will make very field of wide views possible at



Eyepieces compared. From left to right, an Ethos 21mm, a Nagler 31mm Type 5, and the ES 9mm 120 degree.

focal lengths over 21mm. Companies that take risks and push the frontiers gain my respect, so with my predilection for huge complex pieces of glass and metal, I recently bought a new ES 9mm 120 degree eyepiece. In this Presidents corner I will review it for those MDAS members who have not observed through or seen one. They must still be fairly rare as mine was just in from the manufacturer, and is only serial number #36 though it has been available for over 5 months.

Eyepiece field of view has been widening significantly over the past few years from the already wide "standard" 83 degrees of the Nagler, to the 100

Giant Eyepieces (Part 1) *(Continued from the previous page)*

degrees of the Ethos, then to the 110 degrees of the Ethos 3.7mm and 4.7mm eyepieces. 120 degrees raise the bar (or widens the field) yet again. So what is the ES 120 degree 9mm like to handle in the field and of course to view through?

First this eyepiece hits all the superlatives. It is the biggest, heaviest, widest field, and at \$999 the most expensive eyepiece in the astronomy market today outside of some specialist items. In every way this is a really big eyepiece. The pictures here do not actually quite do it justice when put next to the Nagler Type 5 31mm and Ethos 21mm. Though only a little bit longer, it is much more massive and bulkier than either, and at 3 pounds in weight is considerably heavier. Strangely enough though, its size and weight was not something I found intimidating at all, in fact the sheer heft of the eyepiece almost exuded its weighty presence into the view itself. It felt like there was a solid 60" or 100" telescope on the other end rather than the 5" refractor I initially tested on. However this eyepiece is undoubtedly heavy for many telescopes that will need either counter balancing or weight adjusting on the mount. The build quality is very good indeed and it does not in any way feel cheaper than a Televue. The only criticism I could find is that the geometry



Yes, this is a REALLY BIG eyepiece!

of the angled bevel undercut on the 2" barrel (visible in the pictures) does not quite match the non-angled brass compression ring of my diagonal or focuser. That is a minor issue however.

So what is it like to actually observe through this big hunk of glass and metal?

So far I have only tested it in my 5" apochromatic refractor and in all honesty I was quite

blown away by its performance. (At 91X magnification) This was one of those rare first light experiences that generated a very high wow factor. I first pointed at the Trapezium stars in M42 as an obvious and well know target, and the 4 main stars and 2 fainter stars were immediately all visible in only 5" of aperture at high magnification, while at the same time the huge field of view was large enough to take in most of the surrounding nebula as well. A powerful sensation of being close up to the objects being observed while being completely immersed in all the surrounding detail to the edge of sight was immediately apparent.

Compared with the 100 degree field of view Ethos eyepiece line, the hard field stop edge of the ES 120 degree 9mm is

quite hard to even see unless you are looking almost sideways into the eyepiece. When I put an Ethos into my diagonal to compare the difference, it was quite notable how constrained(!) the Ethos view was by comparison. This seems almost a ridiculous statement, given how huge the Ethos field of view is but in that eyepiece you can still see the field stop edge in your peripheral vision. Though the difference between the two eyepiece field of views is only 20 degrees, the ES eyepiece subjectively feels almost twice as wide and offers far more of a floating in space sensation. In fact when looking directly along axis, and even moving my eye around the field I could barely perceive the edge unless I really looked for it. It is that combination of high magnification and hyper-wide field of view makes this the most immersive eyepiece I have ever looked through. As a result some counter intuitive viewing with this eyepiece is possible. For example, I would not normally use a 9mm eyepiece on an largish star cluster like M41 south of Sirius, but with the ES I could fit it all into the field while also being really close up to the individual stars. It was somewhat like having a standard 83 degree 9mm combined with a 17mm 100 degree Ethos all in one eyepiece.

In terms of optical quality I was also very pleasantly surprised. Despite 12 lens elements and even more coated air/glass surfaces, contrast was excellent and stars were sharp right out to the edge with little scatter, and

Giant Eyepieces (Part 1) *(Continued from the previous page)*

my AP130 is a high quality refractor that makes any significant eyepiece aberrations stand out. The most remarkable aspect though, was the combination of magnification and expansive field of view matched with excellent contrast throughout. I did some test comparisons by switching out both 8mm and 10mm Ethos eyepieces, but it was not easy to make an informed initial assessment as I need to do more testing under varied conditions than I have had an opportunity to do so far. I have no sense that the ES eyepiece is less than its Ethos rivals in visual quality, and if it is, it is only by a few percent at most. This is a high quality eyepiece that performs as you would expect for the high price.

I also experimented with a 2X Powermate to double the magnification, and the eyepiece performed well on the Trapezium stars as well, though of course the view was considerably darkened. Barlowing the eyepiece is quite feasible though, and while doing so, I also pointed my telescope at Jupiter and the view of the planet and its satellites was excellent

with minimal flare of scatter from this bright object.

In terms of eye relief, the eyepiece offers about 13mm so it is not that large, and you have to put your eye fairly close to the glass to even have a chance of seeing the whole 120 degree field. It does not matter. The eye-lens itself is so wide, that looking through this eyepiece is like putting your eye up against a plate glass window. In fact the sheer width of the eye-lens is one of the less remarked aspects of its design in other reviews I have read. It actually makes it very comfortable to use though I do not wear glasses when observing. Its sheer mass and size is quite reassuring though the rubber eyecup definitely has to be rolled down to make the most of the wide field of view.

Reading various threads on Cloudynights, I can see there was and still remains some skepticism about this eyepiece, I think largely from those who have not actually looked through one.

From my limited observational experience so far however, I think this is a remarkable eyepiece, much more so than I was expecting. I found myself left with an impression that Televue has fallen behind the



The huge eye-lens of the ES 120 degree 9mm.

curve in not quite having anything like it. (Unless there are any new announcements at NEAF 2013) It is still early days in my making a full assessment though. The weather over the past few weeks in February has not cooperated enough to allow me to test it in my 24" F/3.25 which on paper the eyepiece is really made for, but I have little doubt it will perform as well as it did in my 5" refractor.

Coming later this year in Presidents Corner, an updated review of the ES 120 degree 9mm eyepiece through a wider range of telescopes, plus a review of Explore Scientific's even more extravagant 3" barrel diameter 100 degree field of view 30mm eyepiece that weighs in at 7.5 pounds and its accompanying 3" diagonal. After all I can't resist giant eyepieces, so I went and pre-ordered one for my 6" refractor.

Clear skies!

Chris Ford



First light of the ES 120 degree 9mm using a Astro-Physics AP130 apochromatic refractor.



Project ASTRO



*Show a child the universe and inspire
the next generation of science leaders*

ASP's Project ASTRO partners Teachers with Astronomers in Bay Area Schools & Community Organizations

Project ASTRO seeks 3rd-9th grade teachers and astronomers who have a passion for sharing the wonders of astronomy with students. Teacher-Astronomer partners will attend a free 2-day summer workshop to learn hands-on, inquiry-based astronomy activities designed to inspire and excite students in their science pursuits and eventual professions.

Project ASTRO applications are now being accepted for the 2013-2014 school year. The application deadline is May 29th. All participants are required to attend a free 2-day workshop held August 2-3 at the San Mateo County Office of Education in Redwood City. Program participants receive "The Universe at Your Fingertips 2.0," a compilation of astromy teaching resources, as well as materials from NASA Graduate students and advanced undergraduate students majoring in astronomy are also encouraged to apply!

Apply online to join the Project ASTRO program by May 29, 2013:

Teacher application: astrosociety.org/education/k12-educators/teacher-information/

Astronomer application: astrosociety.org/education/k12-educators/astronomer-information/

Project ASTRO Training Workshop 2013

Friday & Saturday, August 2-3, 2013 9:00a.m.-4:30p.m.
San Mateo County Office of Education, Redwood City, CA
Attendance is required!

Founded in 1889, the ASP is an international science education nonprofit organization that fosters scientific curiosity, science literacy and the joy of exploration & discovery through astronomy, in order to inspire the next generation of science, technology and academic leaders.

CONTACT: Project ASTRO Coordinator: bayareaastro@astrosociety.org

MORE INFORMATION: astrosociety.org/baprojectastro.html

TELEPHONE: 415-715-1426

Scopes Are Needed!

Tuesday March 19, 2013 7:30 p.m. - 8:30 p.m.

Greenbrook Elementary Stargazing, Greenbrook Elementary, Danville, CA Setup 6:30 p.m.

Thursday March 21, 2013 6:30 p.m. - 9 p.m.

Bay Point Library Stargazing, Bay Point Library, Bay Point, CA Setup 5:30 p.m.

Wednesday March 27, 2013 6:00 p.m. - 8:00 p.m.

Stanley Middle School Science Festival, Stanley Middle School, Lafayette, CA Setup 5 p.m.

Thursday March 28, 2013

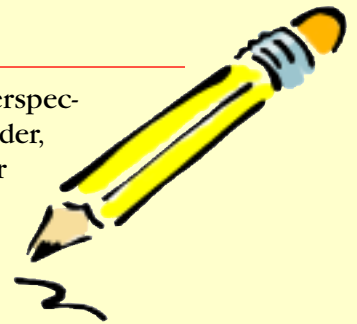
Parkmead Elementary Science Fair and Stargazing, Parkmead School, Walnut Creek, CA

As Always Writers Are Wanted

We are always looking for new articles and content. If you have astronomical perspectives or experiences to share with your fellow members that you would us to consider, please feel free to contact me Chris (cford81@comcast.net) or our newsletter editor Vianney. (veloroute@hotmail.com)

Clear skies!

Chris and Vianney



WHAT'S UP

(continued from first page)

tantly, I'll be discussing how low-cost rockets will affect the frontiers of astronomy!

I've got some great videos to share and would love to hear from all the engineers in the room as to whether they think that rocket re-usability will become a reality in the near future.

Thank you.

Mount Diablo Astronomical Society Event Calendar–March 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
24	25	26	27	28	1	2 Observatory Maintenance (Private) Sunset: 6:06 PM
3	4 Timber Point Stargazing (Private) 	5	6 7:00 PM Astronomy at 40,000 feet	7	8	9 Society Observing (Private) District Science Fair (Private) Sunset: 6:12 PM
10	11 Board Meeting (Private) 	12	13 Cambridge Stargazing (Private)	14	15	16 7:00 PM Public Astronomy: Comets Sunset: 7:19 PM
17	18	19 Greenbrook Stargazing (Private) 	20	21 6:30 PM Bay Point Stargazing	22	23 Sunset: 7:25 PM
24	25	26 6:00 PM Mars Telecon 7:15 PM GenMtg: Colliding Galaxies	27 Stanley Science Festival (Private) 	28 Parkmead Stargazing (Private)	29	30 Sunset: 7:31 PM

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MDAS

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General Meetings:

Fourth Tuesday every month,
except on the third Tuesday in
November and December.

Refreshments and conversations at 6:45 pm;
Meeting begins at 7:15

Where:

Lindsay Wildlife Museum

1931 1st Avenue

Walnut Creek, CA 94597

(925) 935-1978

wildlife-museum.org

Directions to facility:

From the North: Take 680 South to Treat Blvd.
exit. Turn left at light onto North Main St. Turn
right on Geary Road. Turn left on Buena Vista.

Turn right on First Avenue. The museum is
halfway up the block on the left.

From the South: Take 680 North. Take the Treat
Blvd./Geary Road exit and turn left over free-
way. Go three more lights and turn left on
Buena Vista. Turn right on First Avenue. The
museum is halfway up the block on the left.

Parking:

The museum is located in a residential area.
There are no parking fees nor meters. Please
park only in the museum parking lots on the
east side of the museum, the Friends Church lot
across the street (except Sunday mornings) or
on Buena Vista Avenue. Please do not park on
First Avenue in front of our neighbors' homes
— you will get a parking ticket.

